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SOUTHERN FOREST EXPERIMENT STATION

E. L. Demmon, Director

New Orleans, La.

ADVANCE INFORMATION ON THE SUPPLY OF PULPWOOD IN SURVEY UNIT #1 SOUTH CAROLINA

By

SOUTHERN FOREST SURVEY STAFF

I. F. Eldredge

Regional Survey Director

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* - This is an advance release of Forest Survey data that will be included in complete reports to be published later. This information is subject to correction or amplification as computations proceed.

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I. F. Eldredge

Regional Survey Director

This report presents information concerning the quantity of pulpwood in Survey Unit #1, South Carolina which covers twelve counties in the southern part of the state. Its location is shown in Figure 1. The data given in this release are preliminary and are subject to correction and modification when final computations are completed. It is believed, however, that the changes in estimates of pulpwood will neither be extensive nor important. This information is given in advance of the publication of a comprehensive report for the unit covering the quantity, character, growth, and economic aspects of the timber supply expressed in terms of lumber, naval stores, poles, etc., as well as pulpwood.

The estimates of land area and pulpwood volume given are based on data gathered during the period from May to August 1934 by the Forest Survey, a part of the U. S. Forest Service and an activity of the Southern Forest Experiment Station. These data are based on the measurement of the timber and the record of conditions on 6,400 quarter-acre sample plots established in a systematic line plot survey grid-ironing the entire unit. The field work was done by parties of specially trained timber estimators.

The total land area of this unit is 5,186,900 acres. The acreage in each of the several land-use classes is shown in Table 1. Approximately 58 percent of the total land area of the unit is classified as forest land. Thirty-six percent is agricultural, and the remainder falls into other nonforest classes. Thirty-two percent of the forest area is in the flatwoods, the low lying portion of the Atlantic Coastal Plain adjacent to the Atlantic Ocean. This area for the most part is poorly drained and better suited to the growth of timber than to agricultural use. Forty to fifty miles back from the coast lie the rolling uplands on which are found 31 percent of the forest area. Timbered swamps, bays, and poorly drained branch heads account for an additional 29 percent of the forest land while bottomlands lying along the larger rivers and streams bear the remaining 8 percent.

The unit is well served from the viewpoint of transportation. The Seaboard Air Line, the Southern, and the Atlantic Coast railway systems traverse the area and with the Charleston and Western Carolina and the Hampton and Branchville lines reach all parts of the unit both from Savanah and Charleston. Numerous streams suitable for barge traffic penetrate the lower part of the unit. Hard surface roads traverse the area in all directions. Probably not more than 5 percent of the entire unit lies more than 10 miles airline from either rail, highway, or water transportation.

Table 1. - Distribution of land area by class of land use, Survey Unit #1, South Carolina [1]

Land use classes	Area in acres		Percent of total area	
Forest		2,993,000		57.7
Nonforest:				
Agricultural:				
In cultivation:				
Old crop land [2]	1,441,000		27.8	
New crop land [3]	6,400		.1	
Out of cultivation:				
Idle [4]	197,700		3.8	
Abandoned [5]	181,600		3.5	
Pasture:				
Improved [6]	31,400		.6	
Total agricultural		1,858,100		35.8
Other areas:				
Marsh	212,200		4.1	
Waterways	32,200		.6	
Towns and villages	48,200		.9	
Roads, railroads, etc.	43,200		.9	
Total other areas		335,800		6.5
Total forest and nonforest		5,186,900		100.0

[1] Does not include coastal islands and meanderable water areas.
[2] Land cultivated at least 5 years and on which a farm crop was raised within 2 years prior to the date of survey.
[3] Land recently converted from forest to crop land.
[4] Cultivated land that has been idle for two years or more, but which has not reached the abandoned stage.
[5] Land once cultivated but showing distinct evidence of having been abandoned for agricultural crop production; no attempt is being made to maintain it as improved pasture.
[6] Cleared land under fence used primarily for grazing, where a real attempt has been made to produce and maintain a sod.

Forest Area

The forest area classified by forest conditions and by forest type groups is shown in Table 2. The forest types in this unit fall into three broad groups having significance from the viewpoint of pulpwood production. In the first group, the turpentine pines, longleaf and slash, predominate. In the second group, the non-turpentine pines, including loblolly, shortleaf, pond, and spruce pines are the leading species. Hardwoods are found to a limited extent in both of these type groups. In the third group, hardwoods predominate but pine species may be found to a very limited extent. In round figures, the type group in which the nonturpentine pines predominate takes up 41 percent of the forest area, the turpentine pine group 32 percent, and the hardwood group 27 percent. Almost 45 percent of the forest area bears stands of second-growth of saw-log size. The minimum diameter for trees here considered to be of saw-log size is 9 inches for pines and cypress and 13 inches for hardwoods.

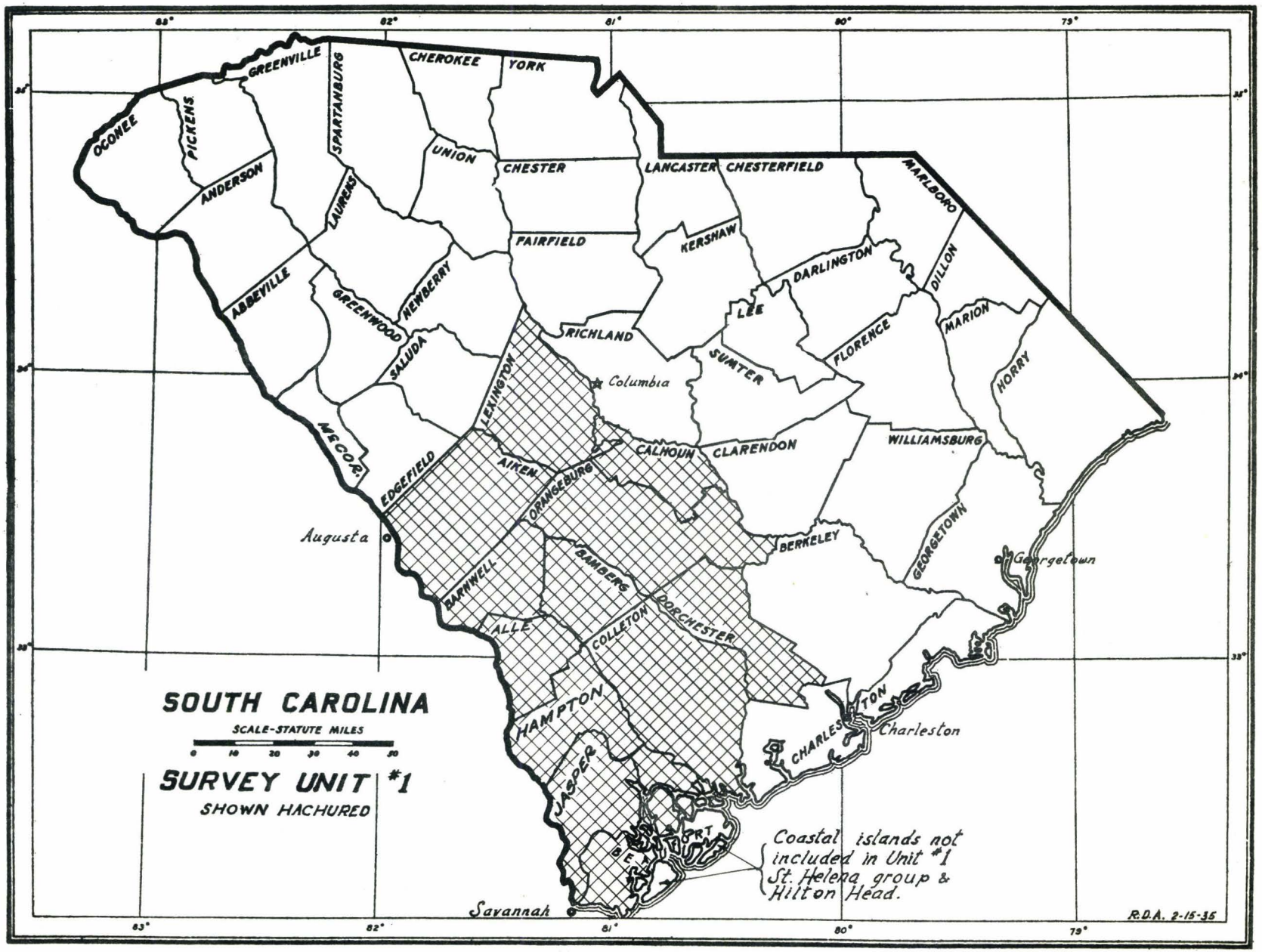

SOUTH CAROLINA
SCALE-STATUTE MILES
0 10 20 30 40 50
SURVEY UNIT #1
SHOWN HACHURED
Coastal islands not included in Unit #1 St. Helena group & Hilton Head.
R.D.A. 2-15-35
GREENVILLE
SPARTANBURG
CHEROKEE
YORK
OCONEE
PICKENS
ANDERSON
UNION
CHESTER
LANCASTER
CHESTERFIELD
MARLBORO
LAURENS
FAIRFIELD
KERSHAW
DARLINGTON
DILLON
ABBEVILLE
GREENWOOD
NEWBERRY
RICHLAND
LEE
MARION
SALUDA
Columbia
SUMTER
FLORENCE
HORRY
LEXINGTON
MCCOR.
CALHOUN
CLARENDON
WILLIAMSBURG
EDGEFIELD
AIKEN
ORANGEBURG
Augusta
BERKELEY
GEORGETOWN
Georgetown
BARNWELL
BAMBERG
ALLE
COLLETON
DORCHESTER
HAMPTON
CHARLESTON
Charleston
JASPER
Savannah

Figure 1

Table 2. - Forest area by forest conditions and forest type groups, Survey Unit #1, South Carolina[1]

Forest Conditions[2]	Forest type groups			Total	Percent of total forest area
	Longleaf and slash pine predominating	Loblolly and other nonturpentine pines predominating	Hardwood predominating		
	Acres				
Old-growth:					
Uncut	16,100	103,600	98,100	217,800	7.3
Partly-cut	61,800	66,800	105,300	233,900	7.8
Second-growth:					
Saw-log size:					
Uncut	327,100	524,100	255,500	1,106,700	37.0
Partly-cut	29,700	159,900	37,800	227,400	7.6
Under saw-log size:					
Uncut	435,700	275,600	229,800	941,100	31.4
Partly cut	25,800	17,700	11,200	54,700	1.8
Clear-cut[3]	8,900	3,200	4,800	16,900	.6
Reproduction	53,800	73,100	67,600	194,500	6.5
Total	958,900	1,224,000	810,100	2,993,000	100.0
Percent of total forest area	32.0	40.9	27.1	100.0	

[1] Does not include coastal islands.

[2] No area was classified as noncommodity (forest areas that do not bear commercial timber species) in this survey unit.

[3] Clear-cut contains a small proportion of fire-killed condition.

Volume Estimate

In the following tables, cordwood volumes are classified by pulping and nonpulping species groups. The pulping species group is subdivided into pine and hardwood, and the pine subgroup in turn is reclassified as turpentine and nonturpentine-pines. The turpentine-pines are further subdivided into round, working and idle, and worked-out groups. These species groups are defined as follows:

1. - Round turpentine-pines - Longleaf and slash pine trees that have never been worked for naval stores, that is, no cups have been hung or faces made for the production of turpentine and rosin.
2. - Working and idle turpentine-pines - Longleaf and slash pine trees that are either being worked for naval stores at the present time; or are in a temporary period of rest between working operations.
3. - Worked-out turpentine-pines - Longleaf and slash pine trees on which as many faces have been placed as the trees will stand; these trees have served their purpose in the production of naval stores and are ready for the axe.

4. - The nonturpentine-pines - Loblolly, shortleaf, pond, and scrub pines. They are not used in the production of naval stores, and of course, bear no cups or faces.
5. - Pulping hardwoods - Hardwood species that can be used in the manufacture of paper. They include the gums, the maples, the bays, magnolia, cottonwood, poplar, etc.
6. - Nonpulping hardwoods - Hardwood species that are not generally considered of value for the production of paper, such as oak, hickory, ash, cypress, hackberry, and sycamore.

Loblolly pine is by far the most important of the nonturpentine pines in this unit. In cordwood volume it makes up 78 percent of the total cordage for this group of pines, while pond, shortleaf, and spruce pines make up the bulk of the remainder. Among the pulping hardwoods the major portion of the volume is found in the three gum species. Red gum accounts for 33 percent, black gum 41 percent, and tupelo gum 10 percent of the pulping hardwood cordage; the remaining 16 percent being mostly maple and yellow poplar. In the nonpulping hardwood group, cypress accounts for 30 percent of the volume, the red oaks 31 percent, the white oaks 13 percent, and scrub oaks 3 percent. The remaining 23 percent is accounted for by numerous miscellaneous species, chief amoung which are the ashes, the hickories, and the elms.

The hardwoods and cypress occur chiefly in the bottomlands and in the swamps, bays, ponds, and branch heads. The best stands are to be found on the flood plains of the larger streams. The turpentine pines are found mainly on the higher ground. Loblolly pine may be found on the higher ground with the turpentine pines but is more characteristic of the lower-lying areas and is often found with the hardwoods. It grows up quickly on agricultural lands after they have been abandoned for cultivation and many old field stands of this species are to be found in the unit.

In estimating the volume of pulpwood, only live timber of pulping species was considered. All sound trees five inches and over in diameter at breast height were included; wood under four inches in diameter outside of bark was excluded from the estimate. No limbwood was included. An approximate deduction was made for woods cull, that is, that portion of the trees that would be left in the woods on account of rot, fire scar, crook, bad knots, or other defect. Volumes of the entire butt sections (approximately 10 feet long) of working, resting, and worked-out turpentine trees were omitted from the estimate. Later information may show that a substantial percentage of these butt sections can be used for pulpwood. In that event, the totals given here will be proportionately increased in later reports.

Throughout this release, where the subdivision of classifications has resulted in relatively small tabular values under certain of the headings, these small amounts are to be taken, not as exact expressions of the items, but as showing their relative amounts in comparison with other items and the proportion which they make up of the totals. Under the system of sampling used in the collection of survey volume and area data, items which are of infrequent occurence and relatevely small in quantity cannot be determined with the degree of accuracy obtainable for the items which occur in greater quantities.

The total amount of cordwood, both pulping and nonpulping, in stands in South Carolina Unit #1, is given in Table 3 by species groups and forest type groups. The cord used is the standard cord, 4 by 4 by 8 feet, measured with bark on.

Table 3. - Estimate of cordwood, by pulping and nonpulping species groups, and by forest type groups, Survey Unit #1, South Carolina [1]

Tree species groups	Forest type groups			Total
	Longleaf and slash pine predominating	Loblolly and other nonturpentine pines predominating	Hardwood predominating	
	Thousands of cords [2]			
Pulping species:				
Pines:				
Turpentine pines: (longleaf and slash)				
Round	3,199	265	11	3,475
Working and idle	1,171	94	2	1,267
Worked-out	181	15	-	196
Nonturpentine pines (loblolly, shortleaf, pond, and scrub)	883	11,324	306	12,513
Total pines	5,434	11,698	319	17,451
Hardwoods (gum, maple, bay, magnolia, etc.)	354	3,232	7,132	10,718
Total cordwood in pulping species	5,788	14,930	7,451	28,169
Nonpulping species:				
Hardwoods (cypress, oak, hickory, ash, etc.)	510	2,019	3,906	6,435
Total cordwood	6,298	16,949	11,357	34,604

[1] Does not include coastal islands.

[2] To convert to full number of cords add "000".

While Survey Unit #1, South Carolina, lies toward the northern limits of the naval-stores belt, the naval-stores industry is actively extending its operations into this area, and it is reasonable to assume that a considerable portion of the longleaf and slash pine timber will be worked out for turpentine and rosin before it is available for utilization as pulpwood. Taking this into account, Table 4 has been prepared to show the volume of pulpwood in species not used in naval-stores production and in turpentine-pines which have already been fully exploited by naval-stores operators. In this unit, 72 percent of the total pine cordwood volume is in the nonturpentine pines and 1 percent in worked-out turpentine pines. The amount of pulpwood in the form of worked-out turpentine pines increases each year. This is due to the fact that the naval-stores industry annually abandons working trees in its older

operations transferring its activity to round timber. These worked-out trees are not usually utilized for saw-timber or other products as rapidly as they are thrown out of naval-stores production and are left to accumulate in the woods.

The volume estimates given in this release are based upon a conversion into cords of standing timber suitable for pulpwood. No attempt is made here to estimate the proportion of the amount of standing timber that will presently be available for use as pulpwood. This estimate would be governed by such factors as the prior claims of established industries, the accessibility of the timber stands and the percentage of stands that must be reserved to assure reproduction and to provide growing stock for continued operation.

Table 4. - Estimate of pulpwood, not including round, working, or idle turpentine pine, classified by tree species groups and forest type groups, Survey Unit #1, South Carolina [1]

Tree species groups	Forest type groups			Total
	Longleaf and slash pine predominating	Loblolly and other nonturpentine pines predominating	Hardwood predominating	
	Thousands of cords [2]			
Pines:				
Turpentine pines: (longleaf and slash) Worked-out	181	15	-	196
Nonturpentine pines (loblolly, shortleaf, pond, and scrub)	883	11,324	306	12,513
Total pines	1,064	11,339	306	12,709
Hardwoods (gum, maple, bay, magnolia, etc.)	354	3,232	7,132	10,718
Total pulpwood, (not including round, or working and idle turpentine pines)	1,418	14,571	7,438	23,427

[1] Does not include coastal islands.

[2] To convert to full number of cords add "000".

The total estimate of cordwood, exclusive of that in round, working, and idle turpentine pines, is shown by diameter classes in Table 5. Trees in the 6, 8, 10, and 12 inch diameter classes are not usually in demand by the lumber industry. The trees in these classes make up 38 percent of the total nonturpentine pine and worked-out turpentine pine cordwood and 44 percent of the cordwood in the pulping hardwood species.

Table 5. - Estimate of cordwood, not including round, working, or idle turpentine pine, classified by forest type groups, and by species groups and diameters of trees, Survey Unit #1, South Carolina [1]

Tree species groups	Tree diameters [2]	Forest type groups			Total
		Longleaf and slash pine predominating	Loblolly and other nonturpentine pines predominating	Hardwood predominating	
	Inches	Thousands of cords [3]			
Worked-out turpentine pines (longleaf and slash)	6" - 8"	18	3	-	21
	10" - 12"	91	7	-	98
	14" - 18"	63	5	-	68
	20" & over	9	-	-	9
Total worked-out turpentine pines		181	15	-	196
Nonturpentine pines (loblolly, shortleaf, pond, and scrub)	6" - 8"	174	1,482	37	1,693
	10" - 12"	285	2,677	66	3,028
	14" - 18"	290	3,752	103	4,145
	20" & over	134	3,413	100	3,647
Total nonturpentine pines		883	11,324	306	12,513
Pulping hardwoods (gum, maple, bay, magnolia, etc.)	6" - 8"	120	839	1,077	2,036
	10" - 12"	119	940	1,599	2,658
	14" - 18"	85	1,031	2,703	3,819
	20" & over	30	422	1,753	2,205
Total pulping hardwoods		354	3,232	7,132	10,718
Nonpulping hardwoods (cypress, oak, hickory, ash, etc.)	6" - 8"	209	466	690	1,365
	10" - 12"	211	544	1,092	1,847
	14" - 18"	81	539	1,079	1,699
	20" & over	9	470	1,045	1,524
Total nonpulping hardwoods		510	2,019	3,906	6,435
Total cordwood (not including round, working, or idle turpentine pines)		1,928	16,590	11,344	29,862

[1] Does not include coastal islands.

[2] Diameter measurments on all nonturpentine pines and all hardwoods were taken at 4 - 1/2 feet above the ground. Diameter measurements on worked-out pines were taken at 10 feet above the ground, and represent the bottom diameter of the part of the stem above the turpentine-butt section. The two-inch diameter classes used are designated by the midpoint of each class; accordingly the 6-inch class includes trees from 5.0 to 6.9 inches, and the 8-inch class from 7.0 to 8.9 inches.

[3] To convert to full number of cords add "000".

The estimate of cordwood by diameter classes for the round, working, and idle turpentine pines is shown in Table 6. The volume in trees which are in demand by the naval-stores industry amounts to only 27 percent of the total pine volume.

Table 6. - Estimate of cordwood in round, and in working and idle turpentine pines, by forest type groups and diameters of trees, Survey Unit #1, South Carolina [1]

Tree species groups	Tree diameters [2]	Forest type groups			Total
		Longleaf and slash pine predominating	Loblolly and other nonturpentine pines predominating	Hardwood predominating	
	Inches	Thousands of cords [3]			
Round turpentine pines (longleaf and slash)	6" - 8"	1,184	78	3	1,265
	10" - 12"	1,106	79	5	1,190
	14" - 18"	600	82	3	685
	20" & over	309	26	-	335
Total round turpentine pines		3,199	265	11	3,475
Working and idle turpentine pines (longleaf and slash)	6" - 8"	202	13	-	215
	10" - 12"	539	35	2	576
	14" - 18"	351	38	-	389
	20" & over	79	8	-	87
Total working and idle turpentine pines		1,171	94	2	1,267
Total		4,370	359	13	4,742

[1] Does not include coastal islands.

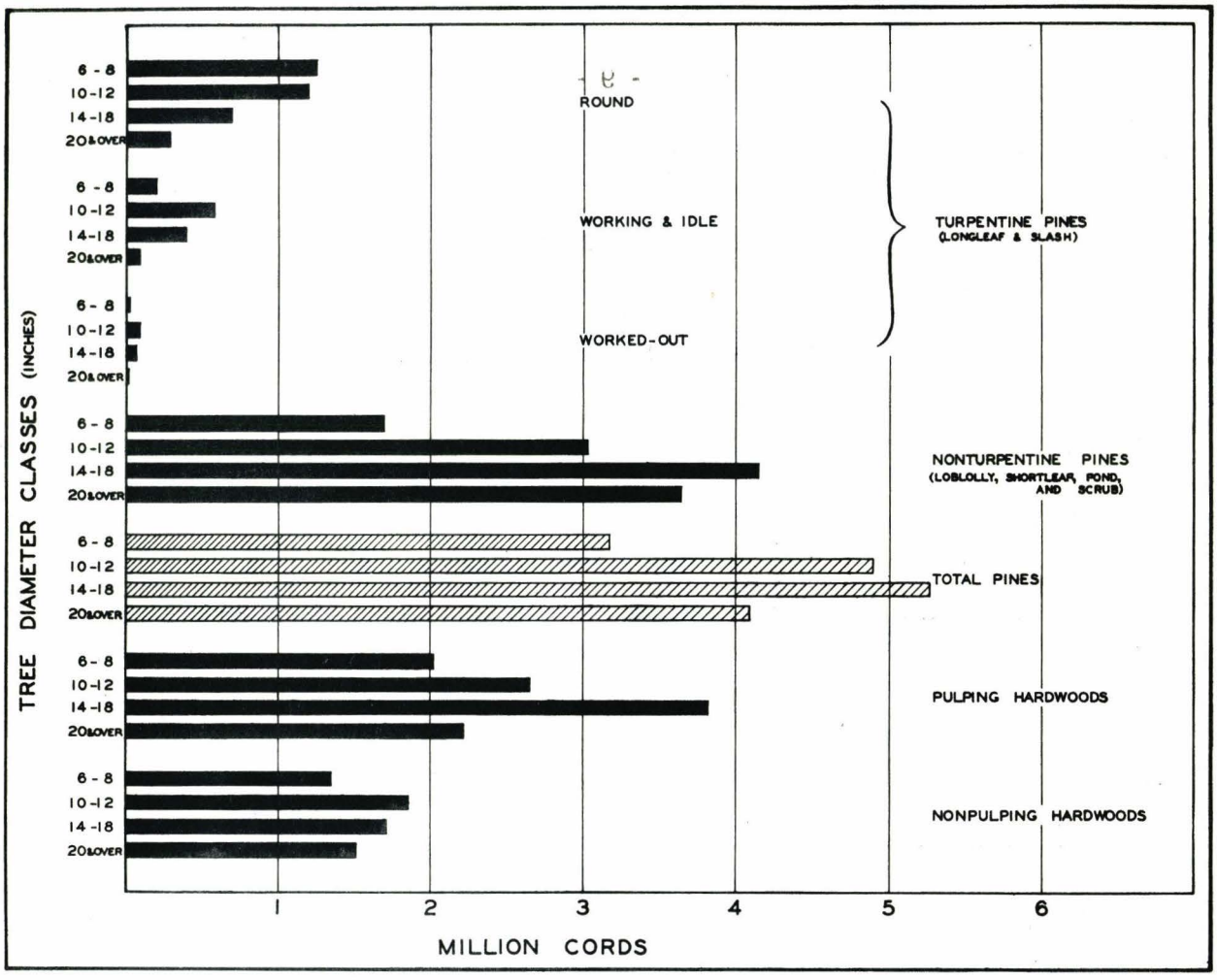
[2] Diameter measurements on round turpentine pines, nonturpentine pines, and hardwoods were taken at 4 - 1/2 feet above the ground. Diameter measurements on working, idle, and worked-out turpentine pines were taken at 10 feet above the ground, and represent the bottom diameter of the part of the stem above the turpentine-butt section. The two-inch diameter classes used are designated by the midpoint of each class; accordingly the 6-inch class includes trees from 5.0 to 6.9 inches, and the 8-inch class from 7.0 to 8.9 inches.

[3] To convert to full number of cords add "000".

Taken together the two preceding tables cover all of the species groups, and show for each group the distribution of volume by diameter classes. Combining the pulping species, both pine and hardwood, 19 percent of the total pulpwood is in trees of the 6 and 8 inch diameter classes, 27 percent is in trees of the 10 and 12 inch classes, 32 percent is in trees of the 14 to 18 inch classes, and 22 percent is in larger trees.

Significant data from Tables 5 and 6 are presented graphically in Figure 2.

Figure 2. - Estimate of cordwood volume, classified by species groups and tree diameter classes, [1] Survey Unit #1, South Carolina [2]



[1] Diameter measurements on round turpentine pines, nonturpentine pines, and hardwoods were taken at 4 - 1/2 feet above the ground. Diameter measurements on working, idle, and worked-out turpentine pines were taken at 10 feet above the ground, and represent the bottom diameter of the part of the stem above the turpentine-butt section. The two-inch diameter classes used are designated by the midpoint of each class; accordingly the 6-inch class includes trees from 5.0 to 6.9 inches, and the 8-inch class from 7.0 to 8.9 inches.

[2] Does not include coastal islands.

The cordwood volume for the average acre, classified by species groups and diameter classes, is shown in Table 7. The volume for the average acre is a theoretical figure arrived at by dividing the total number of cords of wood in each species group and diameter class by the forest acreage bearing commercial timber species.

Table 7. - Estimate of cordwood on the average acre of forest land,[1] classified by species groups and diameters of trees, Survey Unit #1, South Carolina[2]

Tree species groups	Tree diameters in inches[3]									
	6" - 8"		10" - 12"		14" - 18"		20" & over		Total	
	Cords	% of total	Cords	% of total	Cords	% of total	Cords	% of total	Cords	% of total
Turpentine pines: (longleaf and slash)										
Round	.42	3.6	.40	3.5	.23	2.0	.11	.9	1.16	10.0
Working and idle	.07	.6	.19	1.6	.13	1.1	.03	.3	.42	3.6
Worked-out	.01	.1	.03	.3	.02	.1	.01	.1	.07	.6
Nonturpentine pines (loblolly, shortleaf, pond, and scrub)	.57	4.9	1.01	8.7	1.38	12.0	1.22	10.6	4.18	36.2
Total pine pulpwood	1.07	9.2	1.63	14.1	1.76	15.2	1.37	11.9	5.83	50.4
Pulping hardwoods (gum, maple, bay, magnolia, etc.)	.68	5.9	.89	7.7	1.27	11.0	.74	6.4	3.58	31.0
Total pulpwood	1.75	15.1	2.52	21.8	3.03	26.2	2.11	18.3	9.41	81.4
Nonpulping hardwoods (cypress, oak, hickory, ash, etc.)	.45	3.9	.62	5.4	.57	4.9	.51	4.4	2.15	18.6
Total	2.20	19.0	3.14	27.2	3.60	31.1	2.62	22.7	11.56	100.0

[1] The entire forest area of 2,993,000 acres was considered in finding the average acre.

[2] Does not include coastal islands.

[3] Diameter measurements on round turpentine pines, nonturpentine pines, and hardwoods were taken at 4 - 1/2 feet above the ground. Diameter measurements on working, idle, and worked-out turpentine pines were taken at 10 feet above the ground, and represent the bottom diameter of the part of the stem above the turpentine-butt section. The two-inch diameter classes used are designated by the midpoint of each class; accordingly the 6-inch class includes trees from 5.0 to 6.9 inches, and the 8-inch class from 7.0 to 8.9 inches.

Growth

The calculation of the annual growth of the present timber stands in this unit has not been completed, and the result of the Survey's findings in this respect will be shown in a later more comprehensive report for the unit. This report will be published as soon as all field data have been assembled, computed, and analyzed. It will be sent to those who express a desire to receive copies.